

REMARKS

Claims 1, 6-8, 10, 11 and 17 are pending in this application.

Claims 1, 6-8, 10, 11 and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over EP 586,911 and Sylling et al. WO 85/01938.

Examiner asserts that EP '911 teaches a composition for the treatment of soil containing an anionic fertilizer and anionic polymer such as polyacrylamide and 97 to 0 mole percent of different water-soluble monomer or salts thereof. Additionally EP '911 teaches a crosslinking agent within the said copolymer to achieve a soil grouting composition.

The instant invention claims an aqueous soil treatment "consisting essentially" of water and an ionic, water soluble fertilizer of at least 10 wt. % and a water-soluble anionic polymer formed from 60 to 80 wt.% anionic monomer and from 10 to 20 wt.% nonionic monomer.

EP '911 does not disclose the particular ratio of anionic monomer to nonionic. The Examiner has selected from a generic disclosure the particular copolymer of the instant invention, including a ratio of monomers not exemplified. Further, the examiner asserts that the various ratios of monomers do not affect the viscosity. Hence, the Examiner equates the polymers exemplified in EP '911 with the instant invention. It is well known from the literature that the degree of ionization of a particular polymer and the addition of electrolyte to the aqueous solution significantly affects the viscosity. (See enclosed copy of *Textbook of Polymer Science*, 3rd ed., Edited by Fred W. Billmeyer, Jr., A Wiley Interscience Publication, 1984.)

Polymers with ionizable groups along the chain, termed polyelectrolytes, normally exhibit properties in solution that are quite different from those with nonionizable structures.....

...the ionic charges attached to the chains create regions of high local charge density, affecting the activity coefficients and properties of small ions in these localities. Although the various effects cannot be separated completely, the results of chain expansion are of primary interest for the measurement of molecular weight and size.

Those properties depending on the size of the chain, such as viscosity and angular dependence of light scattering, are strongly affected by chain expansion. The viscosity may even increase markedly as polymer concentration decreases, with consequent increase in the degree of ionization of the polymer.

As shown in the above literature, % ionic charge of the polymer matter a great deal in determining viscosity. The Applicant avers that there is no suggestion in EP '911 that a copolymer made up of the Applicants ratios of ionic and nonionic polymers in combination with an ionic soil nutrient would be at all similar, obvious or be even deliverable to the site of soil stabilization from EP '911.

Furthermore, EP '911 teaches compositions that must contain a redox couple in order to crosslink the polymer to form a stable gel. The Applicant emphatically disagrees that this reference would make obvious compositions that do not contain the redox couple.

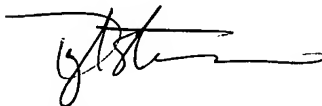
Examiner further asserts that the WO '938 reference teaches a composition for soil treatment comprising anionic polymeric materials such as copolymers of acrylic acid, methacrylic acid (lines 11-21 on page 4). "One having ordinary skill in the art would be motivated at the time of invention to prepare beneficial compositions for the improvement of soil because prior art cited above teach the composition useful for the same."

However, WO 85/01938 primary object is "to provide an improved method for desalination and rehabilitation of irrigated soil." (see page 2, lines 18-19). The disclosure uses a commercially available material known as "Belcene 200", a water-soluble hydrolyzed maleic anhydride polymer TO REDUCE HARMFUL EFFECTS OF SALTS AND/OR ALKALINE DEPOSITS IN SOIL. Whereas WO 85/01938 teaches to take off salts from the soil, the instant invention deals with a process and compositions, which add fertilizer to the soil. There is no motivation suggested within WO 85/01938, to use a composition whose purpose is desalination of soils, for the purpose of fertilization.

The Applicant further avers that the combination of EP '911 with WO '938 does not give the instant composition. EP '911 does not disclose in a single example the Applicants ratio of ionic to nonionic copolymers in combinations with a soil nutrient. WO '938 only exemplifies a particular anionic (a water-soluble hydrolyzed maleic anhydride) polymer. EP '911 further requires a redox couple. If these references were combined as the Examiner suggests, the Applicants invention would not be the result.

Reconsideration and withdrawal of the rejection of claims 1, 6-8, 10, 11 and 17 is respectfully solicited in light of the remarks *supra*.

Respectfully submitted,



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Enclosures: Request for Continued Examination under 37 CFR 1.114.

Form PTO-1449

Reference-*Textbook of Polymer Science*, 3rd ed., Edited by Fred W. Billmeyer, Jr., A Wiley
Interscience Publication, 1984,

Petition for Extension of Time.

Translation for JP51-124578

TEXTBOOK OF POLYMER SCIENCE

THIRD EDITION

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A Wiley-Interscience Publication

John Wiley & Sons

New York • Chichester • Brisbane • Toronto • Singapore

G. POLYELECTROLYTES

Polymers with ionizable groups along the chain, termed polyelectrolytes, normally exhibit properties in solution that are quite different from those with nonionizable structures. There are many examples of polyelectrolytes, including polyacids such as poly(acrylic acid) and hydrolyzed copolymers of maleic anhydride, polybases such as poly(vinyl amine) and poly(4-vinyl pyridine), polyphosphates, nucleic acids, and proteins.

When they are soluble in nonionizing solvents—for example, poly(acrylic acid) in dioxane—polyelectrolytes behave in completely normal fashion, but in aqueous solution they are ionized, with three major results. First, the mutual repulsion of their charges causes expansions of the chain far beyond those resulting from changes from good to poor solvents with ordinary polymers. The size of the polyelectrolyte random coil is, moreover, a function of the concentrations of polymer and added salt, if any, since both influence the degree of ionization.

Second, the ionization of the electrolyte groups leads to a variety of unusual effects in the presence of small amounts of added salt. The intensity of light scattering decreases because of the ordering of the molecules in solution, while the osmotic pressure and ultracentrifugation behavior are determined predominantly by the total charge on the molecule (Donnan effect).

Finally, the ionic charges attached to the chains create regions of high local charge density, affecting the activity coefficients and properties of small ions in these localities. Although the various effects cannot be separated completely, the results of chain expansion are of primary interest for the measurement of molecular weight and size.

Those properties depending on the size of the chain, such as viscosity and angular dependence of light scattering, are strongly affected by chain expansion. The viscosity may even increase markedly as polymer concentration *decreases*, with consequent increase in the degree of ionization of the polymer. When very high chain extensions are reached (up to half of the fully extended chain length), the effect reverses, but it does not disappear at infinite dilution. On the other hand, the addition of low-molecular-weight electrolyte (salt) to the aqueous solution increases the ionic strength of the solution outside the polymer coil relative to that inside, and also reduces the thickness of the layer of "bound" counterions around the chain. Both effects cause the chain to contract, and when the concentration of added salt reaches, say, 0.1 M, behavior is again normal. With some special precautions, molecular weights may be measured by light scattering and equilibrium ultracentrifugation, and intrinsic viscosity-molecular weight relations may be established for polyelectrolytes in the presence of added salt.

Because of the preponderance of small ions, the colligative properties of polyelectrolytes in ionizing solvents measure counterion activities rather than molecular weight. In the presence of added salt, however, correct molecular weights of polyelectrolytes can be measured by membrane osmometry, since the small ions can equilibrate across the membrane. The second virial coefficient differs from that previously defined, since it is determined by both ionic and nonionic polymer-solvent interactions.